

CORRES CONTROL
OUTGOING LTR NO

#000051284

DOE ORDER# 4700.1

15RF 01960

EG&G ROCKY FLATS

EG&G ROCKY FLATS, INC

ROCKY FLATS PLANT, P O BOX 464 GOLDEN COLORADO 80402 0464 • (303) 966 7000

February 23, 1995

95-RF-01960

Kurt Muenchow
Environmental Restoration Division
DOE, RFFO

OPERABLE UNIT 5, WOMAN CREEK PRIORITY DRAINAGE CHEMICALS OF CONCERN (COC)
TECHNICAL MEMORANDUM (TM) #11 MEETING MINUTES - CAB-018-95

Action Forward meeting minutes to the regulatory agencies

Enclosed are the minutes from the meeting held on February 16, 1995, with the, Environmental Protection Agency (EPA) and the Colorado Department of Public Health and Environment (CDPHE) The purpose of the meeting was to discuss whether arsenic is a Potential Chemical of Concern (PCOC) and how it should be included in the Human Health Risk Assessment (HHRA)

It was agreed that arsenic is attributable to background and should not be considered a PCOC in any media at OU5 It was also agreed that the background risk of arsenic should be calculated and discussed in the uncertainty section of the HHRA of the RFI/RI Report Carl Spreng, CDPHE, requested a few days to confirm these discussions with his department

Please transmit the attached meeting minutes to the EPA and the CDPHE If you have any questions regarding this transmittal, please contact me at extension 9100

If I can provide any additional information, please call me at 966-9100

CAB
Carol A Bicher
Operable Unit No 5 Closure
Environmental Restoration Program Division

CAB cb

Orig and 1 cc - K Muenchow

Enclosure
As Stated

ADMIN RECORD

cc
Paul Singh - ORNL

A-0005-000056

DIST	LTR	SC
AMARAL ME		
BURLINGAME A H		
BUSBY W S		
BRANCH D B		
CARNIVAL G J		
DAVIS J G		
FERRERA D W		
FRAY R E		
GEIS J A		
GLOVER W S		
GOLAN P M		
HANNI B J		
HARMAN L K		
HEALY T J		
HEDAH T		
HILBIG J G		
HUTCHINS N M		
JACKSON D T		
KELL R E		
KUESTER A W		
MARX G E		
MCDONALD M M		
MCKENNA F G		
MONTROSE J K		
MORGAN R V		
POTTER G L		
PIZZUTO V M		
RISING T L		
SANDLIN N B		
SCHWARTZ J K		
SETLOCK G H		
STEWART D L		
STIGER S G		
TOBIN P M		
VOORHEIS G M		
WILSON J M		

M. BUDDY ✓✓
F. W. CRAMER ✓✓
M. L. HOGG ✓✓
E. C. MAST ✓✓
A. PALACHE ✓✓
R. A. SANDRA ✓✓
M. SIDES ✓✓
CORRES CONTROL X X
ADMN RECORD/080 V V
TRAFFIC
PATS/T130G
N. A. HOLSTEN ✓✓
CLASSIFICATION

UCNI	
UNCLASSIFIED	✓
CONFIDENTIAL	
SECRET	

AUTHORIZED CLASSIFIER
DOCUMENT SIGNATURE
REVIEW WAIVER PER
CLASSIFICATION OFFICE
DATE

IN REPLY TO RFP CC NO

ACTION ITEM STATUS
□ PARTIAL/OPEN N/A
□ CLOSED
LTR APPROVALS

ORIG & TYPIST INITIALS

CAB / SB

Meeting Date/Time: February 16, 1995/0830

Meeting Location. Advanced Sciences, Inc (ASI), Lakewood, CO

Meeting Subject Review of Background Comparison and Application of Professional Judgement for Arsenic, Operable Unit No 5, Rocky Flats Environmental Technology Site

Attendees	<u>Name</u>	<u>Affiliation</u>
	Carol Bicher	EG&G
	Sherry Boboricken	ASI
	Win Chromec	EG&G
	Doug Dennison	ASI
	Mary Lee Hogg	ICF Kaiser
	Mike Kelly	Dames & Moore
	Bonnie Lavelle	EPA
	Kurt Muenchow	DOE/RFFO
	Al Palachek	EG&G
	Rotha Randall	EG&G
	Mary Siders	EG&G
	Paul Singh	ORNL/RFFO
	Carl Spreng	CDPHE

Materials that were handed out during this meeting were the viewgraphs (Attachment 2) and ordered listings, probability plots, and other information regarding the distribution of arsenic in several media

Introduction- C Bicher restated the purpose and goal of this meeting K Muenchow discussed that the goal of the meeting should be revised to state that arsenic may be retained for evaluation in the risk assessment without being referred to as a chemical of concern (COC)

B Lavelle - Stated that EPA believes that there is a misunderstanding between EPA's understanding of a COC versus what DOE/RFFO and EG&G consider a COC In EPA's CERCLA process, a COC indicates that this chemical should be looked at further, not that it has to be evaluated in the quantitative risk assessment The COC-selection process is not used at all sites and should be very conservative The COCs may be readdressed during the exposure assessment and the toxicity assessment using more realistic assumptions and data aggregation The exposure and toxicity assessments feed the risk characterization, and the reality of all assumptions can be re-evaluated during the risk characterization phase At the completion of the risk characterization, interface with the feasibility study (FS) is crucial, note that EPA's decision

criteria for remediation is 10^{-4} . Remedial action objectives (RAOs) do not need to be developed for all COCs but only those that are the risk drivers

W Chromec - Stated that due to schedule constraints, the FS TM1 has to address all COCs. At subsequent steps in the FS, the results of the risk characterization can be incorporated and only those constituents that are risk drivers will be evaluated

B Lavelle - Discussed that far too much time appears to be spent on the selection of COCs while it may be important to concentrate on problems with the process being used to select the PCOCs

M Siders - Related that there are no problems with the statistical tests themselves, but that professional judgment is not being applied appropriately

C. Spreng - Questioned whether arsenic was identified as a PCOC through the agreed-upon process

C Bicher - Discussed that arsenic was identified as a PCOC only in groundwater, pond sediments, and stream sediments in the draft-final COC TM and at the January 9, 1995 meeting. Presented summary data for arsenic in all media (Attachment 2). Stated that the meeting would focus on arsenic in these three media and how the Gilbert Methodology was applied

B Lavelle - Stated that there appears to be a disconnect between Gilbert's recommendations on how to treat non-detects and how EG&G is treating them

C Bicher - Stated that the treatment of non-detects would be discussed under the discussion of arsenic in groundwater

Process Knowledge of Arsenic

C Bicher - Discussed that there is no data that would indicate that arsenic was used in large quantities at RFETS

B Lavelle - Questioned whether CDH's report has information from employees outside of the plutonium processing operations, such as from maintenance workers

M.L Hogg - Stated that there is no indication of widespread use of arsenic at RFETS in either the reports prepared by CDH or the Historical Release Report

R Randall - Stated that the waste streams for each building were evaluated

Arsenic in Pond Sediments

C Bicher - Discussed that, due to the lack of background data (Rock Creek) for pond sediments, the background comparison for pond sediments was performed using background data for both seep sediments and stream sediments. Due to differences in geochemical setting of pond sediments and stream sediments, the background comparison should be limited to only seep sediments. A seep is more like a pond in that it is a zone of accumulation for sediment, whereas stream sediments are in transport.

M Siders - Discussed that the distribution of trace elements is controlled by sediments, shale, etc. that contain large quantities of fine-grained material (clays). Pond and seep sediments are more geochemically similar due to low-energy environments where more fine-grained materials would accumulate. Therefore, comparison to stream sediments is probably not appropriate due to differing geochemical regimes.

C Spreng - Questioned whether the small sample size also creates problems.

A Palachek - Discussed that the question is whether the samples are a representative population.

C Bicher - Stated that OU3 compiled data for other Front Range reservoirs and lakes that could be used for comparison.

C Spreng - Questioned whether more samples are needed.

A Palachek - Stated that the question is whether more samples will produce a better representation of the site conditions. The small sample size is very important when determining average concentrations for risk assessment. The uncertainty associated with a small sample size will produce a large UCL.

B Lavelle - Questioned if it would be valid to perform a background comparison using both OU5 and OU6 data for pond sediments.

R Randall - Presented a map of arsenic concentrations in surface soils and sediments across RFETS.

C Bicher - Stated that OU6 compared to seep sediments and did not identify arsenic as a PCOC. A combined analysis would not likely identify arsenic as a PCOC.

C Spreng - Questioned whether the statistical comparisons could be performed with the combined OU5 and OU6 data sets.

C Bicher - Stated that the comparisons could be performed with the combined data sets relatively easily

B Lavelle - Questioned if COCs for the drainages should be considered on a site-wide basis

K Muenchow - Stated that, due to similar potential sources, this may be appropriate

M L. Hogg - Stated that because the statistical comparisons of pond sediment data for OUs 5 and 6 to background seep sediment data individually do not indicated that arsenic is a PCOC, statistical tests on the combined OU5 and OU6 data sets will not likely tell us anything new

B Lavelle - Agreed But looking to the future, it may make sense to look at the drainages on a site-wide basis

C Bicher - Questioned if it can be concluded that arsenic is not a PCOC for pond sediments in OU5 based on comparison to seep-sediment background

B Lavelle - Agreed with this argument, based on the statistical tests

C Spreng - Also agreed, but would like to confirm this with his department

D Dennison - Discussed that by using only seep sediment background, many of the metals previously identified as PCOCs would not be identified as PCOCs Only mercury, potassium and zinc would be identified as PCOCs in pond sediments

M L Hogg/W Chromec - Stated that it would be likely that only mercury would be identified as a COC

B Lavelle - Agreed with using only seep sediment background data for comparison with pond sediments

C Spreng - Agreed

Arsenic in Stream Sediments

C Bicher - Presented information for arsenic in stream sediments Discussed that only the Gehan test indicated a difference in OU5 concentrations versus background and that the small sample size may limit the validity of the statistical tests

D Dennison - Discussed that although arsenic concentrations in stream sediments generally increase with distance downstream, they show a different pattern than that shown by the other metals Arsenic concentrations in sediments from Woman Creek and the South Interceptor Ditch

(SID) are similar and show similar increases in concentration with distance downstream, while the concentrations of copper, mercury, and zinc are relatively high at sampling station SED507 located in the SID within IHSS 115 (Attachment 2) Copper, mercury, and zinc are also identified as PCOCs for surface soils and are present in high concentrations in surface soils within IHSS 115

B Lavelle - Expressed concern with this argument, because, in the January meeting, the presentation indicated that the histograms and box plots showed a difference in populations. Questioned why the t-test was not run.

D Dennison - Stated that the t-test is not run when the sample size is less than 20.

C Spreng - Stated that the increase in concentrations with downstream distance is not a convincing argument.

M Siders - Stated that the concentrations of arsenic detected in stream sediments are within the range found in surface soils throughout the Front Range.

K Muenchow - Questioned whether arsenic can be excluded as a COC or called background if the risk associated with it is calculated and included in the uncertainty section.

W Chromec - Stated that the ultimate goal of the process must be kept in mind. Even if arsenic is carried through the risk assessment, it will not drive a remedial decision. We appear to be struggling with the terminology of a COC. To call a chemical a COC does not imply that Rocky Flats introduced this chemical to the environment.

M Siders - Discussed that the geometric mean of arsenic concentrations in shale is approximately 10 mg/kg and that shale is very prominent in the Front Range. From a geochemical interpretation, it isn't appropriate to call arsenic a PCOC when it is at background levels.

M L Hogg - Stated that background risk for OU5 will be calculated.

C Spreng - Expressed concern that the agreed-to process was being circumvented.

M Siders - Stated that Phase V of Gilbert's process allows professional judgement to determine the reasonableness of retaining each chemical as a PCOC, by looking at the geochemistry, the site's history, etc.

K. Muenchow - Stated that it will be very important to put the site risk in perspective by showing background risk in the RI Report.

R Randall/W Chromec - Discussed that EG&G is considering preparing a background risk paper that can be referenced by and incorporated into each RI Report

B Lavelle - Stated that she will discuss this approach with EPA toxicologists and risk assessors

C Bicher - Restated that the agreement is to calculate background risk for arsenic, but questioned whether it should be retained as a PCOC and included in the concentration-toxicity screen

B Lavelle - Stated that arsenic in stream sediments should not be a PCOC and should be considered to be background, based on the geochemical interpretation that professional judgement indicates that arsenic levels are attributable to background

C. Spreng - Agreed, but will need to confirm this with his department.

Arsenic in Groundwater

C Bicher - Presented information for arsenic in groundwater Discussed that due to the low frequency of detection, only the UTL_{99/99} comparison was performed and a normal UTL_{99/99} was used It may be more appropriate to use a lognormal UTL_{99/99}

M Siders - Discussed that, due to large number of nondetects, even the UTL_{99/99} comparison is not valid It may be more appropriate to compare to the background range of concentrations

B Lavelle - Stated that it appears from the ordered listing that the OU5 data are within the background range

W Chromec - Stated that OU2 and OU6 are handling arsenic in groundwater in the uncertainty section

B Lavelle - Questioned why the other tests were not run, when Gilbert does not have a cut-off for percent non-detects for the statistical tests

M. Siders - Discussed that anything greater than 50 percent non-detects is recognized by most statisticians as a cut-off for all statistical tests and referenced several sources

B Lavelle - Agreed with handling arsenic in groundwater as background, calculating the risk and discussing in the uncertainty section Also, stated that the statistics are not conclusive and that the decision is based on Phase V of the Gilbert Methodology, professional judgement

C Spreng - Agreed with handling groundwater the same as stream sediments but will need to confirm with his department

Status of Comments on COC TM and EATM

C Bicher - Comment responses for the COC TM were sent to both agencies. Carl Spreng has indicated agreement with responses. For EPA comments, the comment response sheets will be revised to incorporate barium as a PCOC in subsurface soils and sent for approval.

B Lavelle - Agreed to send a letter stating that EPA understands that the comment responses will be revised to reflect retainment of barium as a PCOC in subsurface soils. Comments on the EATM will be sent after the exposure factors meeting to be held February 21, 1995.

Summary

The following action items resulted from this meeting:

- 1 Carl Spreng, CDPHE, will confirm that arsenic will not be included as a PCOC for groundwater, stream sediments, and pond sediments.
- 2 Bonnie Lavelle, EPA, will discuss the proposed approach for preparing a report discussing background risk with EPA toxicologists and risk assessment staff.
- 3 Bonnie Lavelle, EPA, will send a letter regarding responses to comments on the COC TM and will send comments on the EATM after the meeting to be held on February 21, 1995.

MEETING AGENDA

OU 5 Woman Creek Priority Drainage

February 16, 1995
Advance Sciences, Inc
8 30

- I Introduction
- II Status of the COC TM
- III Process Knowledge of Arsenic
- IV Arsenic in Pond Sediments
- V Arsenic in Stream Sediments
- VI Arsenic in Groundwater
- VII Summary

OPERABLE UNIT 5 WOMAN CREEK PRIORITY DRAINAGE

FEBRUARY 16, 1995 MEETING

Human Health Risk Assessment ARSENIC

PURPOSE:

To review the Background Comparison and the applied Professional Judgment of Arsenic in OU 5

GOAL

By media, agree on whether or not arsenic is attributable to background or a chemical of concern, and if a quantitative risk assessment should be conducted with the results discussed in the uncertainty analysis of the HHRA

DRAFT-FINAL CHEMICALS OF CONCERN TECHNICAL MEMORANDUM
(Also Reference January 9, 1995 Meeting Notes and Handouts)

<u>MEDIA</u>	<u>PCOC?</u>
Surface Soils	No
Groundwater	Yes
Subsurface Soils	No
Surface Water	No
Seep Water	No
Pond Sediments	Yes
Seep Sediments	No
Stream Sediments	Yes

SUMMARY OF ARSENIC DATA FOR OU5

MEDIUM	SAMPLE SIZE	MEAN	MAXIMUM
Surface Soil (mg/kg)	91	46	89
Subsurface Soil (mg/kg)	239	39	189
UHSU Groundwater - total (µg/l)	17	56	133
UHSU Groundwater - dissolved (µg/l)	14	41	81
Surface water - total (µg/l)	27	44	57
Surface water - dissolved (µg/l)	27	48	36
Seep water - total (µg/l)	1	10U	10U
Seep water - dissolved (µg/l)	0	NA	NA
Pond Sediments (mg/kg)	6	55	98
Seep Sediments (mg/kg)	4	57	65
Stream Sediments (mg/kg)	8	35	55

U = Not detected

NA = Samples not taken in this medium

PROCESS KNOWLEDGE

No references were found indicating that arsenic was used in any large quantities at RFETS

- Reconstruction of Historical Rocky Flats Operations & Identification of Release Points (CDH, 1992)
- Historical Release Report for the Rocky Flats Plant (EG&G, 1992)
- ERPD Library search some references discussing arsenic as a sample analyte or within a general discussion of chemicals

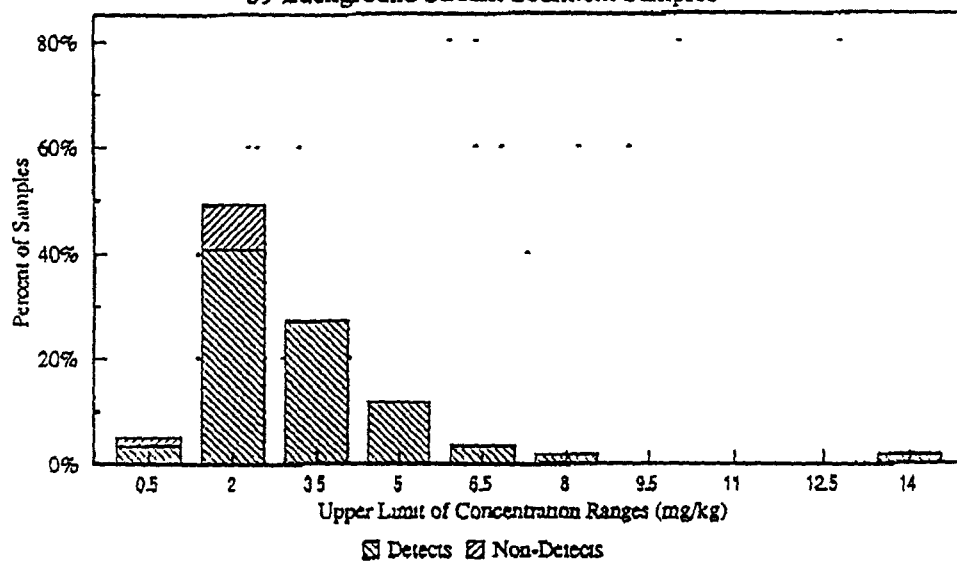
POND SEDIMENTS

- No background data available for Pond Sediments
- Background Comparison to Seep Sediments No statistical difference
- Background to Comparison to Stream Sediments Not appropriate because constituents in a stream are in transport where as a seeps and ponds are a zone of accumulation This correction needs to be made in the COC TM
- Other metals?

FIGURE 1 - HISTOGRAM, ARSENIC IN POND SEDIMENTS
(VERSUS STREAM SEDIMENT BACKGROUND)

DISTRIBUTION OF ARSENIC IN POND SEDIMENTS

59 Background Stream Sediment Samples



6 Site Samples

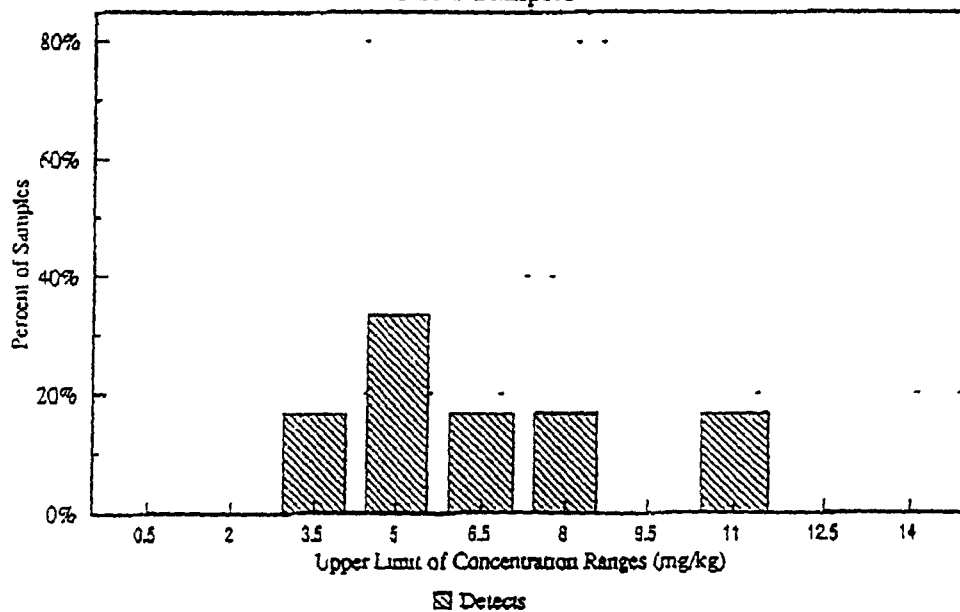
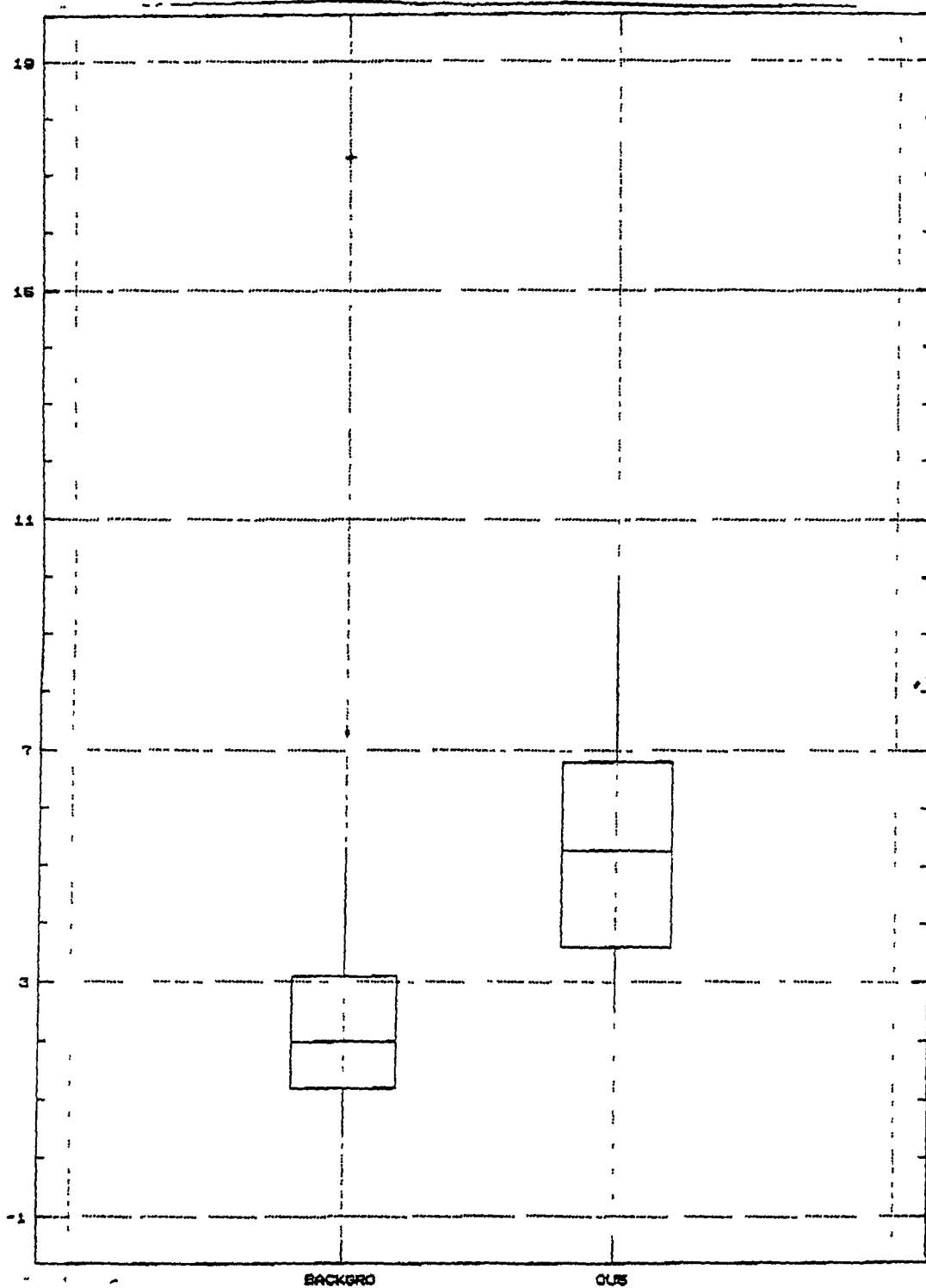


FIGURE 2 - BOX & WHISKER PLOT, ARSENIC IN POND SEDIMENTS
(VERSUS STREAM SEDIMENT BACKGROUND)



STREAM SEDIMENTS

- Background Comparison The Gehan test indicated a statistical difference
- OU 5 data set N=8
- Background Data set ~~large # of non-detects~~
- Copper, mercury, and zinc Concentrations do not increase with increasing distance downstream
These metals are COC's in surface soils
- Arsenic Concentrations do increase with increasing distance downstream Arsenic is not a PCOC is surface soils

FIGURE 4 - BOX & WHISKER PLOT, ARSENIC IN STREAM SEDIMENTS

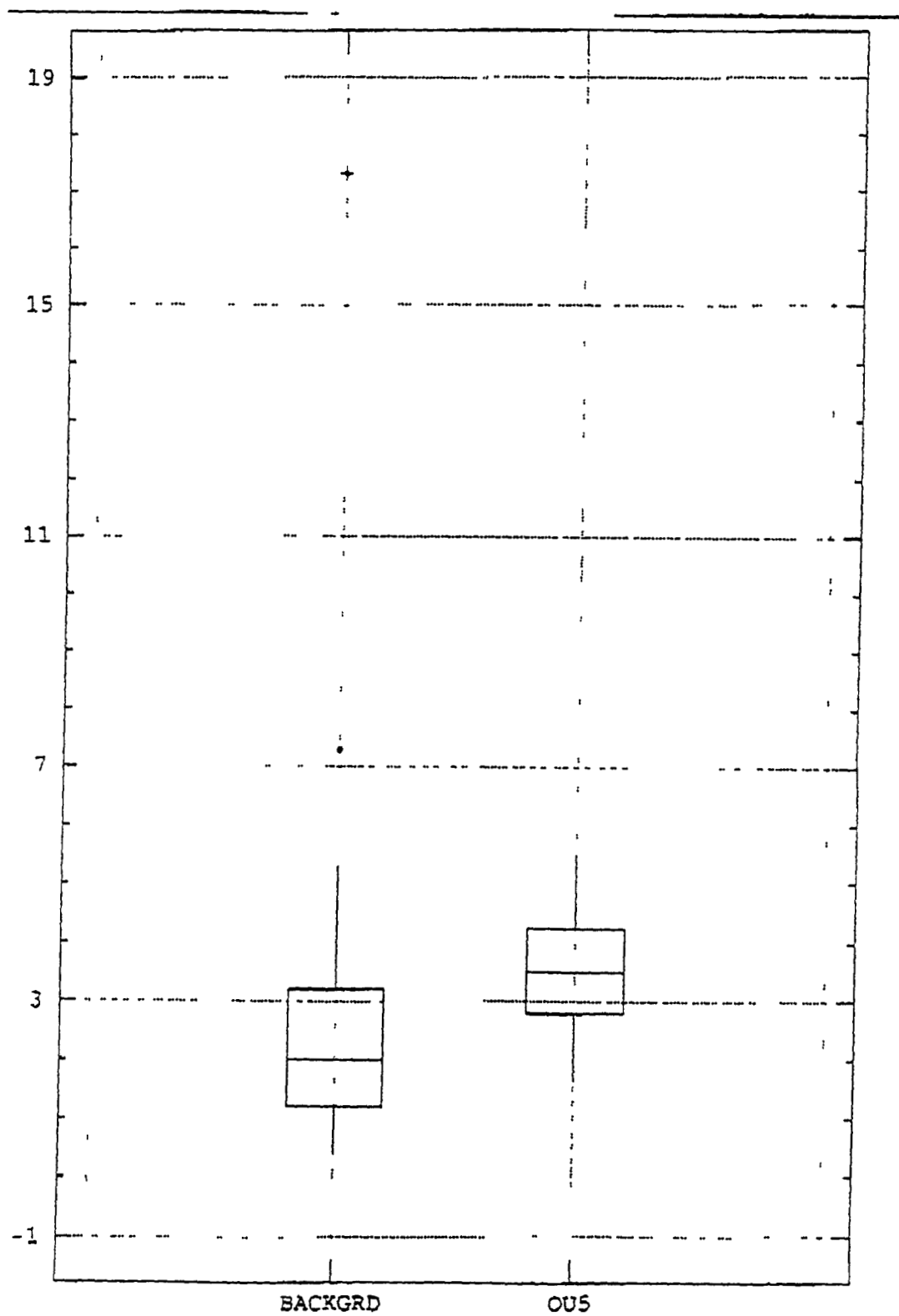
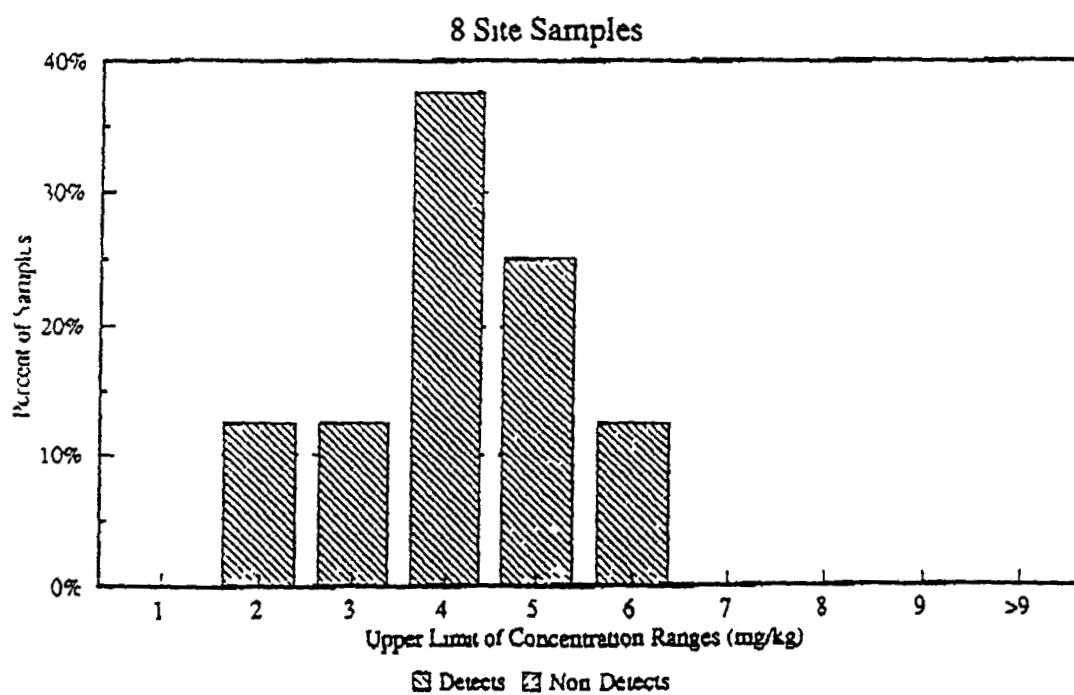
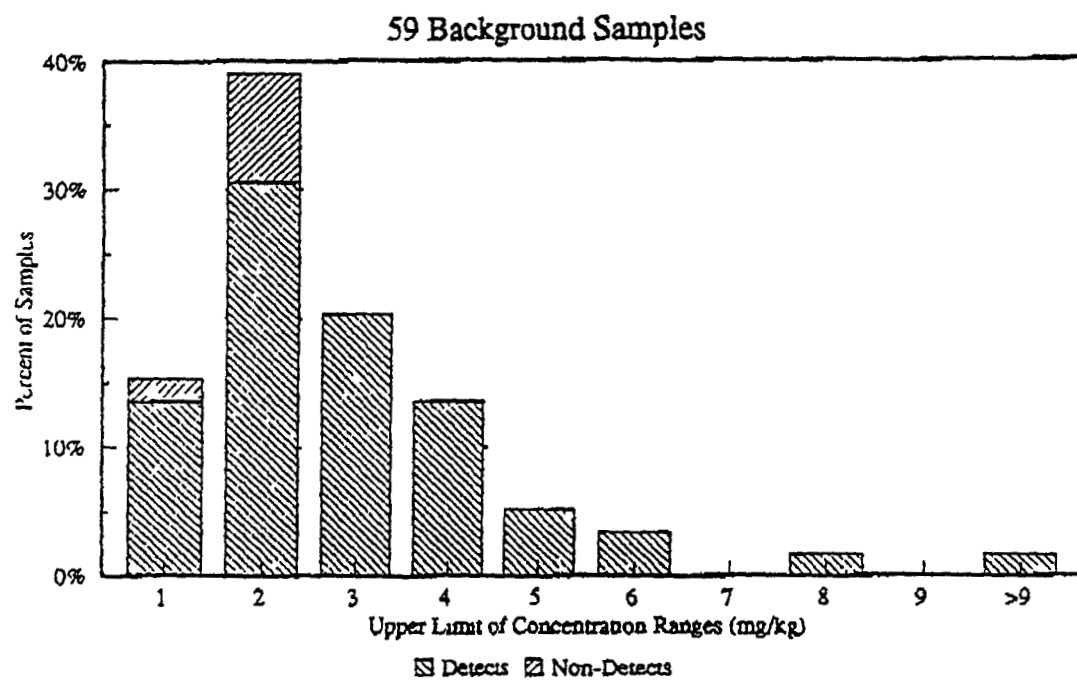
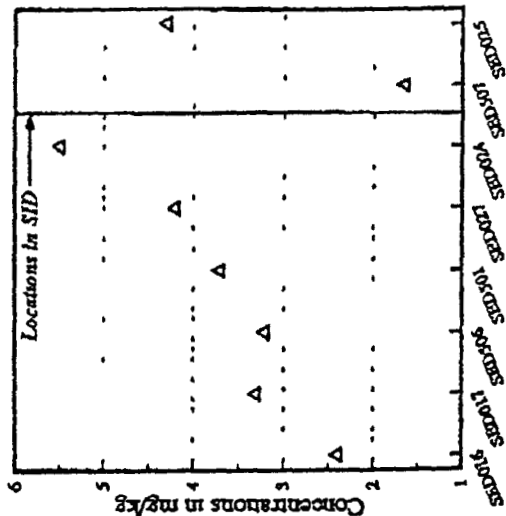


FIGURE 3 - HISTOGRAM, ARSENIC IN STREAM SEDIMENTS

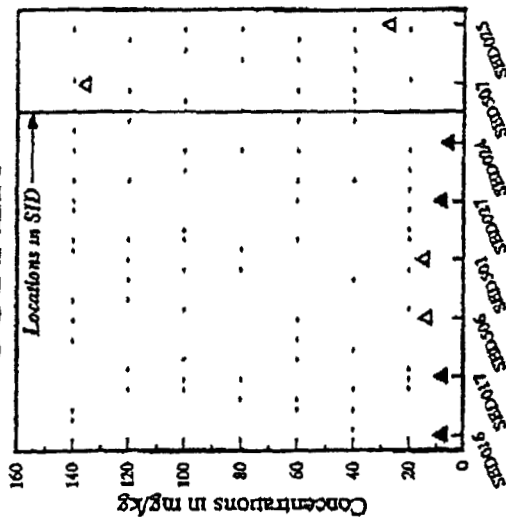
DISTRIBUTION OF ARSENIC IN STREAM SEDIMENTS



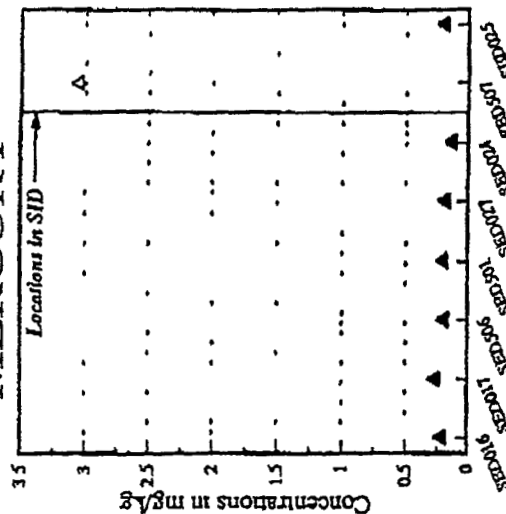
ARSENIC



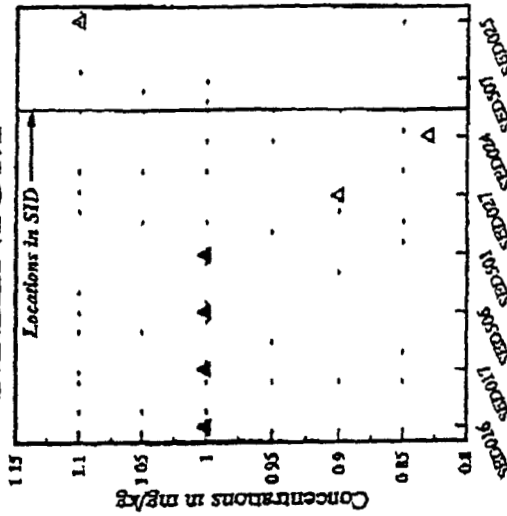
COPPER



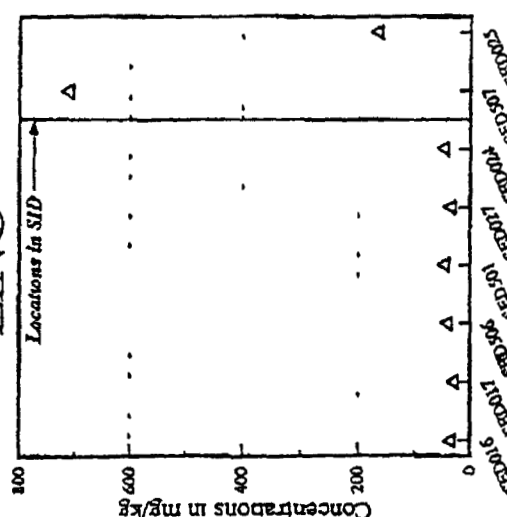
MERCURY



SELENIUM



ZINC



EXPLANATION

- ▲ = Non detect
- △ = Defect

See Figure 6-2 for map of sampling locations

CONCENTRATIONS OF CONSTITUENTS

IN STREAM SEDIMENTS

VERSUS DISTANCE DOWNSTREAM

CHEMICALS OF CONCERN (COC) TM

OPERABLE UNIT NO. 5

U.S. DEPARTMENT OF ENERGY

ROCKY FLATS GOLDEN COLORADO



FIGURE 10-1

GROUNDWATER

- Background Comparison Statistical tests were not run due to the low frequency of detection (12%) for total arsenic in the UHSU
- Background Comparison to the $UTL_{99/99}$

Maximum Concentration in QU5	Background $UTL_{99/99}$ Normal distribution	Background $UTL_{99/99}$ <u>Lognormal distribution</u>
13.3 $\mu\text{g/l}$	8.2 $\mu\text{g/l}$	19.3 $\mu\text{g/l}$

- Comparison of the MCL to the lognormal $UTL_{99/99}$ may be more realistic
 - Issaks and Srivastava, 1989
 - EPA, 1992

SUMMARY

- Is Arsenic a PCOC in Pond Sediments?
Stream Sediments?
Groundwater?
- Background Risk Calculations
- Discussion in the Uncertainty Section of the HHRA

MEETING ATTENDANCE

OU 5 Woman Creek Priority Drainage

February 16, 1995
Advance Sciences, Inc
8 30

	Name	Company	Phone #	Fax #
1	Carol Bicher	EG&G	966-9100	966-8663
2	Win Chromec	EG&G	966-8641	966-8663
3	Mary Lee Hogg	ICF	8711	"
4	AL PALACHEK	EG&G	966-7973	966-2263
5	Carl Spreng	CDPHE	692-3358	759-5355
6	PAUL SINGH	ORNL/RFFO	966-3490	966-4871
7	Doug Dennison	ASI	980-0036	980-1206
8	Kurt Muenchow	DOE		
9	Sherry Boborick	ASI	980-0036	980-1206
10	Ratha Randall	EG&G	966-6924	966-8663
11	Mike Kelly	Dames & Moore	299-7876	299-7977
12	BONNIE LAVELLE	EPA	294-1067	294-7559
13				
14				
15				
16				
17				

pg 1/A
 Feb 16, 1995 Mtg to discuss Chronic,
 as a POC or not and how it
 should be evaluated in the
 risk assessment.

1 Introduction

Purpose

Goal Agenda

2 EPA Position, Bonnie Lucille

- CERCLA position that a POC label

means ~~that~~ we need to look

at it further, that it is above

backgrounds and should have

its risk quantified. POC does not

necessarily mean site contaminated

- A POC selection is conservative

and at the EPA and Tox Asset

looking at using more realistic assumptions and

- then this feeds into the risk char.

w/ discussion on concentration,

how we oversight, land use, etc.

- at risk char stage can now look

a POC based on re look at this stage

EPA (10-4) - is one Decision Criteria For Renovation

- This feeds the FS, RAOs Derived For Risk

- when Chronic - FS will be done

before this - it is preliminary.

Feb 16, 1995 Mtg continued pg 2/4

- EPA has no interest in making

a construct that is not

site related, a remediation driven

4 Process knowledge

- Bonnie

- when new personnel talk to about use of the

- Not sure, but each ledger waste which

3 Previous POC TM

only want to discuss GW, ponds, &

stream sed.

5 Pond Sediments

- CDH & EPA concurs with arguments that

Ar is not a POC; CDH (Carl) stated

that he wants to confirm this w/ his

dept

- Other metals 1/2 to 2/3 already POCs

- note rules don't change

- CDH & EPA concurs again but CDH

would like to confirm w/ his dep

to stream sed.

Grain test - showed stal diff; N=8

Blank set - large # non detects

- down structure pathways - w/ those on Cu, Hg, Zn

note that Cu, Hg & Zn are POCs in surface & H

pg 3/4

Feb 16, 1995 QUS Arsenic Mtg continued

Sandra Sedo continued

- statistics -

Bonne - why the Y-test was not run?

Doug - because sample size < 20

Bonne

- Kurt - not call it a QIC but call it the risk & present in uncertainty

- combine 5 & 6 data & compare to background solving the small sample size problem

- Mary - ^{from} arsenic in shale is 10. therefore it is more than reasonable to call it background

- Kurt, Dave, ML - we will calculate the background risk

- Phyllis V of Gulliver is Prof. Judgment where you look @ geochemistry history

- EPA & ODA agree that it should not be a PACC issued on Phyllis V (Gulliver's) again ODA would like to confirm this w/ BDEPT.

- Mary Sedo will attend public meetings per Bonne request

pg 3
Feb 16, 1995 QUS Arsenic Mtg continued

to. Gull

- Bkgnd Comp - statistical tests not run due to very high of detection

- Bonne - QUS data was normally distributed

- Mary & Al - statistical problems

- state that observed # < total for Ar in Gull

- ODA & Gull handled Ar in the uncertainty section

- Bonne - why ^{we will} ~~was not~~ other stat tests

- Mary - Because the low freq of det. is not appropriate

- we will call the bkgnd risk but

statistics are

- we will not carry it as a PACC = EPA concur; ODA agrees but will concur, and call it ~~not~~ (that)

- Bonne - because of too many nondet

- the lognormal dist of background arsenic

- is not all that varied.

Bonne

- ODATE, Karl Sprong

- X EPA, Bonnehauehl

- X DOE, Kurt Muenchow

- John